REMARKS

The Claims

Twenty two (22) claims (Claims 1 - 22) are pending in this application through this Amendment. Claims 11, 12 and 21 have been amended by the amendment being filed herewith. The Applicant respectfully requests reconsideration.

Rejection of Claim 1-10 under 35 U.S.C. §103(a) – Foschini et al. in view of Odenwalder

Claims 1 and 2 stand rejected under 35 U.S.C. §103(a) as being unpatentable over "Journal of Lightwave Technology, vol. 6, No. 3" (hereinafter "*Foschini*") in view of U.S. Patent No. 6,621,875 to Odenwalder (hereinafter "*Odenwalder*"). The Applicant respectfully traverses the rejection.

For a rejection under 35 U.S.C. §103(a) that combines prior art references to be proper, a suggestion or motivation must exist for combining the teachings disclosed in the references, and the combined teachings must teach each and every element recited in the rejected claim. This rejection is improper because neither of these requirements is met, as will be described below in detail.

The Examiner cites *Foschini* as disclosing the elements of claim 1 except for the spread spectrum encoders corresponding in number to the information signals, and an amplitude modulation representative of the sum of spread-spectrum information signals. The Examiner cites *Odenwalder* as disclosing these missing elements.

Foschini teaches the use of multiple, randomly selected wavelengths to transmit information signals. As shown in FIG. 2 of *Foschini*, the laser produces a random carrier wavelength that is directly modulated with the information signal to produce a modulated signal. The modulated signal is then encoded with a pseudo-random (PN) sequence. The encoded modulated signals produced by each transmitter are then combined and the total of the encoded signals are delivered to each emanating path. Because each transmitter uses a random carrier that results from the natural dispersion of nominal laser oscillation frequencies, and because the signals are encoded with PN sequences, the spread spectrum signals have enhanced "immunity to a variety of

sources of signal disruption," obviate the need for "coordination among the various users," and allow for "intrinsic security." (*Foschini*, p. 371). To create spread spectrum signals, spreading and dispreading is "done directly on the optical signal by using lithium niobate crystal phase modulators." (*Foschini*, p. 372).

In contrast, the present invention uses spread-spectrum encoding on the information signal itself and then either directly modulate the light source with the encoded information signal (See, for example, FIGs. 4 and 6) or indirectly modulate the light produced by the light source with the encoded information signal. (See, for example, FIG. 6). The encoded information signals are summed either in the electrical domain prior to modulation or in the optical domain after modulation, but in all cases, the resulting spread-spectrum optical signal has "an amplitude modulation representative of the sum of the spread-spectrum information signals", as recited in independent claim 1. These features of the invention of multiplying "the information signals by respective pseudo-noise (PN) code sequences to generate respective spread-spectrum information signals" and "modulating light generated by the light source in response to the spread-spectrum information signals to generate a spread-spectrum optical signal for transmission ... having an amplitude modulation representative of the sum of the spread-spectrum information signals", not only improves tolerance to transmission noise and interference immunity, but also allows multiple information signals to be spatially overlapped in a single spread-spectrum carrier. (See, for example, FIGs. 4, 6 and 7).

Foschini does not teach or suggest these features of the invention. As described above, *Foschini* teaches producing an unencoded modulated signal by directly modulating the laser with an unencoded information signal and then encoding the modulated signal with a PN sequence.

Odenwalder discusses the use of spread-spectrum encoding only in relation to RF transmission (See Col. 4, lines 28 – 31), whereas *Foschini* is directed only to spread-spectrum encoding in a fiber optical local network. In RF communications of the type disclosed in *Odenwalder*, frequency modulated (FM) signals are spread, whereas in *Foschini*, amplitude modulated (AM) signals are spread. These are distinct areas of communications technology. Persons skilled in the art of RF communications would not

look to the art of optical communications to improve RF communications techniques, and vice versa. Furthermore, *Odenwalder* is directed to increasing the number of information signals that can be communicated over a single wavelength whereas *Foschini* is directed to ensuring that different transmitters do not use the same wavelength, and providing improved interference immunity in cases where wavelengths used by different transmitters inadvertently overlap or get to close to one another. Therefore, *Foschini* and *Odenwalder* actually teach away from each other, which demonstrates a lack of a suggestion or motivation to combine the teachings. For this reason, the Applicant respectfully submits that there is no suggestion or motivation to combine the teachings of *Foschine* and *Odenwalder*, and respectfully requests that the rejection be withdrawn.

In addition, as recognized by the Examiner, the spread-spectrum signal described in *Odenwalder* is not a "spread-spectrum optical signal having an amplitude modulation representative of the sum of the spread-spectrum information signals", as recited in independent claim 1. Thus, even the combined teachings of *Foschini* and *Odenwalder* do not result in the invention recited in independent claim 1. As stated above, *Odenwalder* deals with FM signals, which, when combined, do not produce a signal having an amplitude representative of the sum of the spread-spectrum signals. Although *Foschini* deals with AM signals, the signals that are combined are of different random carrier wavelengths such that combining them does not produce a signal "having an amplitude modulation representative of the sum of the spread-spectrum information signals". For these additional reasons, the Applicant respectfully submits that independent claim 1 is patentable over *Foschini* in view of *Odenwalder*, and respectfully requests that the rejection of independent claim 1 be withdrawn.

For at least the reason that claim 2 depends from independent claim 1, and therefore incorporates all of the elements of claim 1, claim 2 is also patentable over *Foschini* in view of *Odenwalder* for the reasons set forth above with reference to claim 1. Accordingly, the Applicant respectfully requests that the rejection of dependent claim 2 also be withdrawn.

Rejection of Claim 3, 9 and 10 under 35 U.S.C. §103(a) – Foschini et al. in view of Odenwalder as applied to Claim 1 and further in view of Nagatani et al.

Claims 3, 9 and 10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Foschin* in view of *Odenwalder* as applied to claim 1 and further in view of U.S. Patent No. 6,097,714 to Nagatani et al. (hereinafter "*Nagatani*"). The Applicant respectfully traverses the rejection.

For at least the reason that claims 3, 9 and 10 depend directly or indirectly from independent claim 1, and therefore incorporate all of the elements of claim 1, these dependent claims are also patentable over *Foschini* in view of *Odenwalder* and in further view of *Nagatani* for the reasons set forth above with reference to claim 1. Accordingly, the Applicant respectfully requests that the rejection of dependent claims 3, 9 and 10 also be withdrawn.

Rejection of Claim 4-8 under 35 U.S.C. §103(a) – Foschini et al. in view of Odenwalder and Nagatani as applied to Claim 3 and further in view of Mori

Claims 4 - 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Foschin* in view of *Odenwalder* and *Nagatani* as applied to claim 3 and further in view of U.S. Patent No. 4,269,482 to Mori (hereinafter "*Mori*"). The Applicant respectfully traverses the rejection.

For at least the reason that claims 4 - 8 depend directly or indirectly from independent claim 1, and therefore incorporate all of the elements of claim 1, these dependent claims are also patentable over *Foschini* in view of *Odenwalder* and *Nagatani* and further in view of *Mori* for the reasons set forth above with reference to claim 1. Accordingly, the Applicant respectfully requests that the rejection of dependent claims 4 - 8 also be withdrawn.

Rejection of Claim 11-16, 21-22 under 35 U.S.C. §103(a) – Myers in view of Nagatani

Claims 11-16 and 21-22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent App. 20030072051 (hereinafter "*Myers*") in view of U.S.

Patent No. 6,097,714 to Nagatani (hereinafter "*Nagatani*"). The Applicant respectfully traverses the rejection.

The Examiner cites *Myers* as disclosing the elements of Claim 11 except for each spread-spectrum information signal having a spectrum spread by a respective pseudo-noise (PN) code sequence, and cites *Nagatani* as disclosing each spread-spectrum information signal having a spectrum spread by a respective pseudo-noise (PN) code sequence.

The Examiner has not set forth any motivation or suggestion to combine the teachings of *Myers* and *Nagatani*. It appears that the Examiner has used the claims of the present application as a road map to combine the teachings of *Myers* and *Nagatani*, which amounts to hindsight reconstruction. For at least this reason, the Applicant respectfully submits that the rejection is improper and requests that it be withdrawn.

In addition, as described below in detail, the combined teachings still do not teach each and every element recited in the claims. Claims 11 and 21 have been amended to further clarify that the receiver comprises an optical detector arranged to receives a "spread-spectrum optical signal having an amplitude modulation representative of the sum of at least two spread spectrum information signals". This feature of the invention is not taught or suggested by *Myers* or *Nagatani*, taken alone or in combination.

Myers discloses a communications system that uses photonic principles to transmit encoded signals and decode the encoded signals on the receiver side. The signals are time-division multiplexed and demultiplexed (See paragraph [0112]). In particular, *Myers* discloses dividing an optical signal into daughter optical signals and using delay elements to delay one of the daughter signals before transmission to time-division multiplex the signals.

Nagatani is directed to quadrature phase shift keying (QPSK) modulation technique that uses spread-spectrum encoding to encode information signals, which are then code multiplexed and input to a QPSK modulator. The output of the QPSK modulator is input to a transmitting power amplifier, which is connected to an RF antenna. Each of the spread spectrum information signals includes a pilot code that is identical for each of the channels. Prior to the signals being code multiplexed, the

signals are phase shifted by a predetermined angle channel-by-channel to prevent the pilot signal portions from forming a peak when they are code multiplexed. Otherwise, the peaks will result in interference in other stations and reduce power efficiency.

The Examiner recognizes that *Myers* does not disclose each spread-spectrum information signal having a spectrum spread by a respective PN code sequence, but finds that *Nagatani* teaches each spread-spectrum information signal having a spectrum spread by a respective PN code sequence. Based on this finding, the Examiner states that it would have been obvious to combine the teachings of *Nagatani* and *Myers* to achieve the invention recited in independent claims 11 and 21. The Applicants respectfully disagree.

As described above, everything disclosed in *Nagatani* is directed to the electrical domain and QPSK modulation of RF signals. Although *Nagatani* does disclose encoding respective information signals with respective PN code sequences, *Nagatani* does not deal with a "spread-spectrum optical signal having an amplitude modulation representative of the sum of at least two spread spectrum information signals", as recited in independent claims 11 and 21. *Myers* also does not suggest this feature of the invention because *Myers* delays one signal relative to the other in order to perform time-division multiplexing. Therefore, the combined teachings of *Nagatani* and *Myers* do not teach each and every element recited in the claims. Furthermore, because *Nagatani* is directed to a frequency division multiplexing technique and *Myers* is directed to a time-division multiplexing technique, these references teach away from one another and therefore should not be combined.

For all of these reasons, the Applicant respectfully submits that independent Claims 11 and 21 are patentable over *Myers* in view of *Nagatani*, and respectfully requests that the rejection of independent claim 11 and 21 be withdrawn.

For at least the reason that claims 12-16 and 22 depend directly or indirectly from independent Claims 11 and 21, respectively, and therefore incorporate all of the elements of Claims 11 and 21, respectively, these dependent claims are also patentable over the prior art of record for the reasons set forth above with reference to Claims 11 and 21. Accordingly, the Applicant respectfully requests that the rejection of dependent Claims 12-16 and 22 also be withdrawn.

Rejection of Claim 17-20 under 35 U.S.C. §103(a) – Foschini in view of Nagatani

Claims 17-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Foschini* in view of *Nagatani*. The Applicant respectfully traverses the rejection.

The Examiner cites *Foschini* as disclosing the elements of Claim 17 except for generating orthogonal or quasi-orthogonal pseudo-noise (PN) code sequences and multiplying each of the information signals by a respective one of the PN code sequences to generate a respective spread-spectrum information signal. The Examiner cites *Nagatani* as disclosing these missing elements.

The Examiner has not set forth any motivation or suggestion to combine the teachings of *Foschini* and *Nagatani*. For the same reasons set forth above that the Examiner's combination of the teachings of *Foschini* and *Odenwald* is improper, the Applicant respectfully submits that the combination of *Foschini* and *Nagatani* is also improper. In short, *Foschini* is directed to optical communications that use AM modulation techniques and *Nagatani* is directed to electrical RF communications that use FM modulation techniques, in particular, QPSK modulation of spread-spectrum-modulated signals. The technologies and applications are completely different, and there is no suggestion or motivation for combining the teachings.

Furthermore, the combination still does not teach the invention recited in independent claim 17. For example, neither reference teaches "multiplying each of the information signals by a respective one of the PN code sequences to generate a respective spread-spectrum information signal" and "modulating the light in response to the spread-spectrum information signals to generate for transmission a spread-spectrum optical signal having an amplitude modulation representative of the sum of the spread-spectrum information signals", as recited in independent claim 17.

For all of these reasons, the Applicant respectfully submits that independent claim 17 is patentable over *Foschini* in view of *Nagatani*, and respectfully requests that the rejection of independent claim 17 be withdrawn.

For at least the reason that claims 18 - 20 depend directly or indirectly from independent claim 17, and therefore incorporate all of the elements of claim 17, these dependent claims are also believed to be allowable over *Foschini* in view of *Nagatani*

for the reasons set forth above with reference to claims 17. Accordingly, the Applicant respectfully requests that the rejection of dependent claims 18 - 20 also be withdrawn.

CONCLUSION

In view of the foregoing, the Applicants believe the aforementioned rejections have been overcome and/or traversed and that the application is now in condition for allowance. Should there be any further questions or concerns, the Examiner is urged to telephone the undersigned.

Respectfully submitted,
GARDNER GROFF SANTOS
& GREENWALD, P.C.

/Daniel J. Santos/
Daniel J. Santos, Reg. No. 40,158

GARDNER GROFF SANTOS & GREENWALD, P.C.
2018 Powers Ferry Road, Suite 800
Atlanta, Georgia 30339
Phone: 770.984.2300
Fax: 770.984.0098